

*KHUTORYANSKIY, M. S.*  
ARBUZOV, N.T., kand.tekhn.nauk; GROMOV, V.L., kand.tekhn.nauk; GORSKIY, B.Z.,  
kand.tekhn.nauk; KALISHCHUK, A.L., kand.tekhn.nauk; KUNITSKIY, L.P.,  
kand.tekhn.nauk; KURBATOV, D.I., kand.tekhn.nauk; MOROZOV, N.V., kand.  
tekhn.nauk; Pilyugin, A.I., kand.tekhn.nauk; PRIMAK, N.S., kand.tekhn.  
nauk; SEMENTSOV, S.A., kand.tekhn.nauk; ULITSKIY, I.I., kand.tekhn.  
nauk; KHUTORYANSKIY, M.S., kand.tekhn.nauk; SHERENTSIY, A.A., kand.  
tekhn.nauk; PINSKIY, Ye.A., inzh.; KARSAK, Yu.Ye., red.; PATSALYUK,  
P.M., tekhn.red.

[Civil engineering handbook] Spravochnik po grazhdanskomu stroitel'-  
stvu. Izd. 3-e, perer. i dop. Kiev, Gos. izd-vo tekhn. lit-ry USSR  
Vol. 1. 1958. 867 p. (MIRA 11:5)  
(Civil engineering--Handbooks, manuals, etc.)

ARBUZOV, N.T., kand.tekhn.nauk; GROMOV, V.L., kand.tekhn.nauk; GORSKIY,  
B.Z., kand.tekhn.nauk; KALISHCHUK, A.L., kand.tekhn.nauk; KUBITSKIY,  
L.P., kand.tekhn.nauk; KURBATOV, D.I., kand.tekhn.nauk; MOROZOV, N.V.,  
kand.tekhn.nauk; PILYUGIN, A.I., kand.tekhn.nauk; PRIMAK, N.S.,  
kand.tekhn.nauk; SEMENTSOV, S.A., kand.tekhn.nauk; ULITSKIY, I.I.,  
kand.tekhn.nauk; KHUTOBYANSKIY, M.S., kand.tekhn.nauk; SHERENTSIS,  
A.A., kand.tekhn.nauk; PINSKIY, Ye.A., inzh.; KORSAK, Yu.Ye., red.;  
MATUSEVICH, S.M., tekhn.red.

[Manual on civil engineering] Spravochnik po grazhdanskomu stroi-  
tel'stvu. Izd.4., ispr. Kiev, Gos.izd-vo tekhn.lit-ry. Vol.1.  
1959. 867 p. Vol.2. 1959. 560 p. (MIRA 12:8)  
(Civil engineering)

KHUTORIYANSKIY, Mikhail Semenovich, kand.tekhn.nauk; OSOVSKAYA, I.V., red.;  
ZELENKOVA, Ye.Ye., tekhn.red.

[Economizing materials in construction] *Ekonomiia materialov*  
*v stroitel'stve. Kiev, Gos.izd-vo lit-ry po stroit. i arkhit.*  
USSR, 1959. 233 p. (MIRA 12:8)  
(Building materials)

KHUTORYANSKIY, M.S., kand. tekhn. nauk; TSATSKINA, F.N., inzh.;  
KATSEV, L., red.; TIMOFEYEV, V., tekhn. red.

[Keramzit-perlite concrete and its use in wall slabs]  
Keramzito-perlitobeton i ego primeneniye v stenovykh pa-  
neliakh. Kiev, Izd-vo Akad. stroit. i arkhitekt. USSR, 1962.  
26 p. (MIRA 16:7)  
(Walls) (Lightweight concrete)

KHUTORYANSKIY, M.S., kand.tekhn.nauk; TSATSKINA, F.N., inzh.

New data concerning the preparation of concrete mixes made with  
porous aggregates. Stroi.mat. 8 no.10:20-21 0 '62. (MIRA 15:11)

(Lightweight concrete)

KHUTORYANSKIY, M.S., kand.tekhn.nauk; TSATSKINA, F.N., inzh.

Eliminating deformations in perlite concrete. Stroimaterialy.  
9 no.11:23-24 N '63. (MIRA 17:4)

KHUTORYANSKIY, N. M.

KHUTORYANSKIY, N. M. -- "Some Factors which Determine the Consumption of Liquid Fuel by the Engines of Locomotives with Gas-Generator Equipped Internal Combustion Engines."  
(Dissertations for Degrees in Science and Engineering Defended at USSR Higher Educational Institutions) Min Railways USSR, Moscow Order of Lenin and Order of Labor Red Banner Inst of Engineers of Railroad Transport named I. V. Stalin, Moscow, 1955.

SC: Knizhnaya Letopis' No. 31, 30 July 1955.

\*For the Degree of Candidate in Technical Sciences.

*KHUTORYANSKIY, N. M.*

KRAVETS, Zyama Isaakovich, inzh.; TROFIMOV, Sergey L'vovich, inzh.;  
FIL'KOV, Nikolay Iosifovich, inzh.; KHUTORYANSKIY, N.M., red.;  
BOBROVA, Ye.N., tekhn.red.

[Repair of air compressors of locomotives] Remont vozdukhoduvok  
teplovozov. Moskva, Gos.transp.zhel-dor.izd-vo, 1957. 50 p.  
(MIRA 10:12)

(Air compressors--Maintenance and repair)



*KHUTOR YANSKIY, N.M.*

VERETNIK, Lev Davydovich, inzh.; KOZINETS, Pavel Vasil'yevich, kand. tekhn. nauk; MEHMENTSEV, Sergey Pavlovich, inzh.; KHUTOR YANSKIY, N.M., red.; BOBROVA, Ye.N., tekhn. red.

[Compressors driven by diesel locomotives] Teplovoznye kompressory.  
Moskva, Gos. transp. zhel-dor. izd-vo, 1958. 62 p. (MIRA 11:7)  
(Compressors) (Diesel locomotives)

NASYROV, Rifkat Akhmetovich, kand.tekhn.nauk; KHUTORYANSKIY, N.M.,  
kand.tekhn.nauk, red.; MEDVEDEVA, M.A., tekhn.red.

[Crankgear of diesel locomotives] Shatunno-krivoshipnyi  
mekhanizm teplovoznnykh dizelei. Moskva, Vses.izdatel'sko-  
poligr.ob"edinenie M-va putei soobshcheniia, 1960. 69 p.  
(MIRA 14:1)

(Diesel locomotives)

GAKKEL', Yekaterina Yakovlevna, doktor tekhn.nauk; KOZHEVNIKOV, Vladimir Arsen'yevich, inzh.; KUZNETSOV, Boris Georgiyevich, inzh.; LAPIN, Andrey Vladimirovich, kand.tekhn.nauk; NIKULIN, Mikhail Andreyevich, kand.tekhn.nauk; EZRIN, Grigoriy Semenovich, inzh.; KHUTORYANSKIY, N.M., kand.tekhn.nauk, red.; BOBROVA, Ye.N., tekhn.red.

[Electric machinery and electric equipment of diesel locomotives]  
Elektricheskie mashiny i elektrooborudovanie teplovozov. Pod red.  
E.IA. Gakkal'. Moskva, Vses.izdatel'sko-poligr.ob"edinenie M-va  
putei soobshcheniya, 1960. 218 p. (MIRA 14:1)  
(Diesel locomotives--Electric equipment)

GURSKIY, P.A.; KHUTORYANSKIY, N.M.

Experience in the repair of a thermoelectric diesel unit.. Elek.  
i tepl. tiaga 4 no. 12:17-18 D '60. (MIRA 14:1)  
(Diesel engines--Testing) (Thermocouples)

SHISHKIN, Kirill Aleksandrovich, prof. [deceased]; GUREVICH, Abram Natano-  
vich, kand. tekhn. nauk; STEPANOV, Aleksandr Dmitriyevich, doktor  
tekhn. nauk; VASIL'YEV, Vladimir Andreyevich, inzh.; SURZHIN, Sergey  
Nikolayevich, inzh.; KAMENETSKIY, B.G., kand. tekhn. nauk, retsenzent;  
MOISEYEV, G.A., inzh., retsenzent; TURIK, N.A., inzh., retsenzent;  
SAZONOV, A.G., inzh., red.; KHUTORYANSKIY, N.M., kand. tekhn. nauk,  
red.; KHITROV, P.A., tekhn. red.

[TE3 diesel locomotive] Teplovoz TE3. Izd.2., perer. Moskva, Vses.  
izdatel'sko-poligr. ob"edinenie M-va putei soobshchenia, 1961.  
371 p. (MIRA 14:6)

(Diesel locomotives)

GURSKIY, P.A.; MERRO, Ye.M.; KHUTORYANSKIY, N.M.; ANISIMOV, N.M.;  
ARZHANNIKOV, S.M.; KORENEVSKIY, M.V., inzh., retsenzent;  
STETSENKO, Ye.G., kand. tekhn. nauk, retsenzent; SOBAKIN,  
V.V., inzh., red.; VASIL'YEVA, N.N., tekhn. red.

[Experience in the organization of railroad laboratory for  
the inspection and maintenance of measuring equipment] Opyt  
organizatsii dorozhnoi kontrol'no-izmeritel'noi laboratorii.  
Moskva, Transzheldorizdat, 1962. 167 p. (MIRA 16:1)  
(Railroads—Equipment and supplies)  
(Moscow—Testing laboratories)

KHUTORYANSKIY, Ye. D. (Engineer, Estonian Sovnarkhoz)

"The use of ceramic fluxes for wear-resistant hard facing of slate milling equipment."

Report presented at the 3rd Baltic Conference on Welding, convened by the Sovnarkhozes of the Lithuanian SSR, Latvian SSR, and Estonian SSR, 8-9 April 1964, Vilnius.

[Avtomaticheskaya SVARKA, No. 7, 1964 p. 95]

VOZNESENSKIY, V.V., gornyy inzh.; KHUTORYANSKIY, Ye.Ye., gornyy inzh.;  
AVDONIN, E.I., gornyy inzh.

Starting centrifugal pumps without priming. Ugol' 40  
no.4:75 Ap '65. (MIRA 18:5)



*Khutsaidze, AL.*

11-58-6-8/13

AUTHORS: Rubinshteyn, M.M.; Grigor'yev, I.G.; Gel'man, O.Ya.; Khutsaidze, A.L.; Chikvaidze, B.G.

TITLE: On the Technique of Obtaining Monomineral Fractions for Determining the Absolute Age of Rocks by the Argon Method (K metodike polucheniya monomineral'nykh fraktsiy dlya opredeleniya absolutnogo vozrasta gornykh porod argonovym metodom)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, 1958, Nr 6, pp 95-100 (USSR)

ABSTRACT: The Argon method of determining the absolute age of rocks is the most convenient for wide scale use in geological research. Not all potassium containing minerals can be used for this purpose. The best mineral is mica - and especially muscovite, biotite and glauconite mica. For the purposes of obtaining monomineral fractions of these minerals in large quantities (necessary for mass age determination), the author constructed 2 separators of which descriptions are given.

Card 1/2 There are 2 photos, 2 figures, and 6 references, 4 of which are Soviet and 2 American.

11-58-6-8/13  
On the Technique of Obtaining Monomineral Fractions for Determining the  
Absolute Age of Rocks by the Argon Method

ASSOCIATION: Geologicheskii institut AN GruzSSR, Tbilisi (Geologic In-  
stitute of the AS of the Georgian SSR, Tbilisi)

SUBMITTED: July 15, 1957

AVAILABLE: Library of Congress

Card 2/2 1. Geology 2. Rock-Determination

KHUTSAIDZE, A.L.

Comparative thermographic study of some minerals in vacuum  
and under atmospheric pressure. Soob. AN Gruz. SSR 33 no. 2:  
371-376 F '64. (MIRA 17:9)

RUBINSHTYIN, M.M.; CHIKVAIDZE, B.G.; KHUTSAIDZE, A.L.; GEL'MAN, O.Ya.

Using glauconite for determining the absolute age of  
sedimentary rocks by the argon method. Izv. AN SSSR. Ser.  
geol. 24 no.12:77-83 D '59. (MIRA 13:8)

1. Geologicheskiy institut AN GruzSSR, Tbilisi.  
(Rocks, Sedimentary) (Glauconite) (Argon)

KASHAKASHVILI, N.V.; SHARADZENIDZE, S.A.; MALYSHEV, S.I.; CHKHEIDZE, Z.A.  
GIBRADZE, Sh.S.; KHOSHTARIYA, Sh.F.; RUKHADZE, D.A.; SHARASHIDZE,  
S. Sh. Primali uchastiya: SHENGELAYA, V.; OKROMCHEDLISHVILI,  
Sh.; POPIASHVILI, Sh.; LOLUA, K.; MINDELI, M.; TSKHELISHVILI, D.;  
GORDEZIANI, N.; ODIKADZE, Ch.; TATARADZE, Z.; KHUTSISHVILI, A.

Production and use of highly basic, open-hearth furnace sinters  
from Dashkesan iron ore. Trudy GPI [Gruz.] no. 4: 25-32 '62  
(MIRA 17:8)

KHUTSISHVILI, A.I.

Design of drain holes for the drainage of operating tunnels.  
Trudy GPI [Gruz.] no.7:153-160 '63. (MIRA 18:6)

Author : USSR  
 Title : Cultivated Plants. Fruits. Berries. Nuts. Tea.  
 Journal : Sovetskaya Biologiya, No. 4, 1958, No. 495  
 Editor : Kikacheyshvili, R.M.; Khutsishvili, A.V.  
 Title : Effect of Pinching and Artificial Pollination on the Grape Yield.  
 Title : The Effect of Pinching and Artificial Pollination on the Grape Yield.

Journal : Sad i Ogorod, 1958, No. 5, 66-67

Abstract : Experiments started in 1958 at Dagest Wine Sovkhoz (in Georgia) have demonstrated that pinching the top shoots at the beginning of flowering (Chimuri, Kikacheyshvili, Stolyevy and Chasselas Blanc varieties) can increase the grape yield by 6-15%, pinching the top shoots with simultaneous artificial pollination using mixed pollen by 8-18% and pollination with mixed pollen by means of a pollinator by 6-15%. --Fe.F. Zhukovskaya

CARD : 1/1

CHKHIKVISHVILI, I., red.; KHUTSISHVILI, G., red.; VASINOV, A., tekhn. red.

[Forty years of Soviet Georgia] Sorok let Sovetskoi Gruzii; kratkii  
oherk. Tbilisi, Izd-vo "Sabchota Sakartvelo," 1961. 539 p.  
(MIRA 14:11)

(Georgia—Economic conditions)



MOKEYEVA, R.A.; RUTBERG, R.A.; CHEFNYAK, V.Ya.; MALLER, A.R.; PAPUSH, N.D.;  
SOBOLEVA, Yu.G.; RAKHMAYEVA, V.A.; KHUTSISHVILI, G.E.

Use of plasmapheresis in macroglobulinemic reticulosis; Waldenström's  
disease. Probl. gemat. i perel. krovi 9 no.12:33-40 D '64  
(MIRA 18:1)

1. Gematologicheskaya klinika (zav. - prof. M.S. Dul'tsin) i laboratoriya fraktsionirovaniya belkov (zav. - prof. G. Ya. Rozenberg)  
TSentral'nogo ordena Lenina instituta gematologii i perelivaniya  
krovi (direktor - dotsent A. Ye. Kiselev), Moskva.

PA 53T63

KHUTSISHVILI, G. P.

USSR/Medicine - Malaria  
Medicine - Hearing

Nov/Dec 1947

"Histological Changes in the Aurial Organs Due to  
Malaria," G. P. Khutsishvili, Chair of Pathol Anat,  
Tbilisi Med Inst, 5 pp

"Arkhiv Patolog" No 6

Malaria ranks third as a social disease, after TB  
and syphilis. Article reports results of a four-year  
period of experiments conducted on changes occurring  
in cells of aurial organs due to malaria. Methods of  
study developed at Histological Laboratory of Lenin-  
grad Scientific and Practical Institute for Otorhino-  
laryngology, under the cognizance of M. K. Del'.

LC

53T63

USSR/Medicine - Malaria (Contd)

Nov/Dec 1947

Data reveal that histological changes occurring in  
aurial organs due to malaria are less noticeable than  
those caused by other infectious diseases, including  
scarlet fever, diphtheria, and exanthematous typhus.  
Submitted, 15 Feb 1947. Deputy of Chair: Prof V.  
K. Zagenti, Honorary Promoter of Science.

LC

53T63

*SP* *SP* *Magnesium*

**FINE STRUCTURE OF THE NUCLEAR MAGNETIC RESONANCE ABSORPTION. G. Khataishvili. Uspekhi Fiz. Nauk 48, 324-7(1962) Oct. (in Russian)**

A brief review of several works on the fine structure of the line of nuclear magnetic absorption by protons in various substances, published in J. Chem. Phys. and Phys. Rev. during 1940-1960, is presented.

538.222  
7482. Magnetic susceptibility of chrome alums at low temperatures. O. P. Krausnitskii. Letter in Zh. Eksp. i Teor. Fiz., 22, 383-4 (No. 3, 1952) in Russian.  
The susceptibility of chrome alums is calculated theoretically allowing fully for the Stark effect of the crystalline field and to a first approximation for the spin-spin interaction. The discrepancy between the result of the calculation and the experimental data is attributed to the change in the lattice structure known to occur at about 80°K (the calculations assume the room-temperature structure). D. SHOFERMAN

KHUTSISHVILI, G. R.

Lattice Theory

Reciprocal action of the nuclear spin and vibrations of the crystalline lattice, Zhur. eksp. i teor. fiz. 22, No. 3, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November 1953<sub>2</sub>, Uncl.

KEUTSISHVILI, G. R.

"Magnetic Susceptibility of Alums at Low Temperatures," Tr. in-ta fiziki AN Gruz SSR, No 1, pp 19-30, 1953

Magnetic susceptibility of chrome and ferrous alums at low temperatures are computed under account of internal crystalline Stark effect and magnetic interaction of spins. Some discrepancies between theoretical and experimental results are due, according to the author, to the fact that computations were made for room temperature, while potassium chrome alums undergo a phase transition at 29°K. (RZhFiz, No 6, 1955)

Sum. No. 681, 7 Oct 55

KHUTSISHVILI, G. R.

1/ RML

NU Interaction between spin one-half and vibrations of a crystal lattice: G. R. Khutsishvili. *Trudy Khim. Fiz. Akad. Nauk Gruz. S.S.R.* 1953, No. 1, 31-6; *Referat. Zhur. Fiz.* 1953, No. 4736 (in Russian).—A theory of the relaxation times of nuclear spins is developed. The relationship between the relaxation times and the conversion probability is set forth, and the interaction between the spins and the lattice field is calcd. The conclusions of the theory are compared with some exper. data. Marjorie Keiner.

*PKS*

KHUTSISHVILI, G.R.

4  
1246

U S S R .

Angular distribution of  $\beta$ -radiation. G. R. Khutsishvili (Inst. Phys. Acad. Sci. Georgian S.S.R., 1953). *Zh. teoret. i ekspl. fiz.* 25, 763-4 (1953). — K. discusses the  $\beta$ -radiation of oriented nuclei for forbidden 1st-order transitions by means of tensor variants. The anisotropism is greater for an  $I \rightarrow I - 2$  than for an  $I \rightarrow I + 2$  transition, and is stronger the lower the upper limit of the  $\beta$ -spectrum. F. H. Rathmann

pmc  
204

KHUTSISHVILI, G., R.

Diffusion of nuclear spins toward paramagnetic ions.  
G. R. Khutsishvili. *Trudy Inst. Fiz. Akad. Nauk Gruz. S.S.R.* 2, 115-18 (1954); *Referat. Zhur., Fiz.* 1955, No. 6, 98. The time of nuclear magnetic relaxation produced by paramagnetic mixts. is calcd. According to Bloembergen (C.A. 43, 8273c), the relaxation mechanism is as follows: nuclear spins occurring in direct proximity to paramagnetic ions (during relaxation time of paramagnetic ions  $\rho$ ) arrive at thermal equil. with the lattice. For this reason the spin temp. gradient of nuclear spins develops; this causes their diffusion and finally the system of nuclear spins arrives at thermal equil. with the lattice. Low contents of paramagnetic mixts. are discussed in the work. An exact solution is given for the kinetic equation for nuclear magnetization with appropriate limiting conditions. The expression obtained for time of nuclear magnetic relaxation agrees with exptl. data for dil. chromium at 77°K. However, since the temp. relation of  $\rho$  for dil. alum. is not known, a detailed comparison of the theory with experimentation cannot be made at this time.

Marjorie Ketner

100

4  
1RM



KHUTSISHVILI, G. R.

ISSN/ Physics - Nuclear orientation

Card 1/2 : Pub. 118 - 2/9

Authors : Khutsishvili, G. R.

Title : Orientation of a nucleus

Periodical : Usp. fiz. nauk 53/3, 381-412, July 1954

Abstract : Methods of nuclear orientation are described. Nuclear orientation is understood to indicate a tendency of nuclei to spin in a certain definite direction. The following methods are described: method of polarization by an external magnetic field; quadrupole method; method of paramagnetic salts; Bleaney's method; Garter-Rose's method, and a method of polarization in metals. The following experiments with oriented nuclei are described and analyzed: experiments with oriented nuclei emanating  $\beta$  and  $\gamma$  radiations; experiments with magnetic resonance produced by oriented nuclei; experiments to check Overhauser's theory on nuclear magnetic resonance. Nuclear reactions are also described. Forty-nine references (1944-1954). Table; graphs; diagrams.

FD-3276

USSR/Nuclear Physics - Polarization of ferromagnetic nuclei

Card 1/2 KHUTSISHVILI, G. R.  
Pub. 146 - 35/44

Author : Khutsishvili, G. R.

Title : Polarization of the nuclei of ferromagnetic atoms

Periodical : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 894

Abstract : In the course of the preceding years several indirect methods have been proposed for obtaining oriented nuclei (e.g. R. J. Blin-Stoyle, M. A. Grace, H. Halban, Progress in nuclear physics, 3, 63, Pergamon Press, London, 1953; G. R. Khutsishvili, Uspekhi fiz. nauk 53, 381, 1954). In the present communication the writer presents still another method for obtaining polarized nuclei; namely, a ferromagnetic containing nuclei with spins is cooled to a super-low temperature (e.g. the ferromagnetic is placed in thermal contact with a cooled paramagnetic salt), and then subjected to an external magnetic field exceeding the saturation field, upon which complete polarization of the spins of the shells occurs causing considerable polarization of the nuclei and subsequent rapid relaxation of nuclear spins (since relaxation is connected with the interaction of the nuclei and conduction electrons). He notes that Shchegolev, Alekseyevskiy and Zavaritskiy observed the anisotropy of gamma radiation of Co-60 nuclei polarized by the ferromagnetic method, the intensity of gamma radiation along the external field being 10-15% less than in the perpendicular

Card 2/2

FD-3276

Abstract : direction for 0.05-0.08°K. He thanks N. Ye. Alekseyevskiy, N. V. Zavaritskiy, and I. F. Shchegolev for communication of their results.

Institution: Institute of Physics, Acad. Sci. Georgian SSR

Submitted : July 29, 1955

*Khutsishvili G.R.*

USSR/Nuclear Physics - Beta radiation

FD-1856

Card 1/1      Pub. 146-16/25

Author      : Khutsishvili, G. R.

Title      : Angular distribution of beta-radiation. II

Periodical : Zhur. eksp. i teor. fiz. 28, 370-371, March 1955

Abstract   : Investigation of the beta-radiation of oriented nuclei is of considerable interest since by comparing the measured angular distribution of beta-radiation with the theoretical data one can make conclusions concerning the spins, parities, and magnetic moments of beta-active nuclei. The theoretical study of the angular distribution of beta-radiation was carried out by G. R. Khutsishvili (ibid., 25, 763, 1953) and by Cox and de Groot (Physica, 19, 683, 1953). The author discusses his earlier related work.

Institution:

Submitted   : March 13, 1954

Name: KHUTSISHVILI, Givi Razhdenovich  
Dissertation: Relaxation and Orientation of Nuclei  
Degree: Doc Phys-Math  
Affiliation: Inst of Physics, Acad Sci GSSR  
Defense Date, Place: 14 Nov 55, Council of Tbilisi State  
U imeni Stalin  
Certification Date: 28 Apr 56  
Source: BMVO 4/57

**KHUTSISHVILI, G.R.**

Spin-lattice and spin-spin relaxation in paramagnetics. Soob. AN  
Gruz. SSR 16 no.5:351-356 '55. (MLRA 9:2)

1. Akademiya nauk Gruzinskoy SSR, Institut fiziki, Tbilisi. Pred-  
stavleno chlenom korrespondentom Akademii V.I. Mamasakhlishvily.

KHUTSISHVILI, G.R.

Nuclear magnetic relaxation dependent on spin-orbit coupling by  
conduction electrons. Soob.AN Gruz.SSR 16 no.10:769-774 '55.  
(MLRA 9:5)

1. Akademiya nauk Gruzinskoy SSR, Institut fiziki, Tbilisi.  
Predstavleno chlenom-korrespondentom Akademii V.I. Mamasakhlisovym.  
(Nuclear moments)

ANDRONIKASHVILI, E.L.; BILILASHVILI, M.F.; SAKVARELIDZE, I.I.; KHUTSISHVILI, G.R.

Underground investigation of cosmic rays. Izv. AN SSSR. Ser. fiz. 19 no. 6:  
681-686 N-D '55. (MLRA 9:4)

1. Institut fiziki Akademii nauk Gruz. SSR.  
(Cosmic rays) (Nuclear physics)



KHUTSISHVILI, G. R.

FD-2968

Physics - Magnetic relaxation

Card 1/1

Pub. 146 - 9/28

Author : Khutsishvili, G. R.

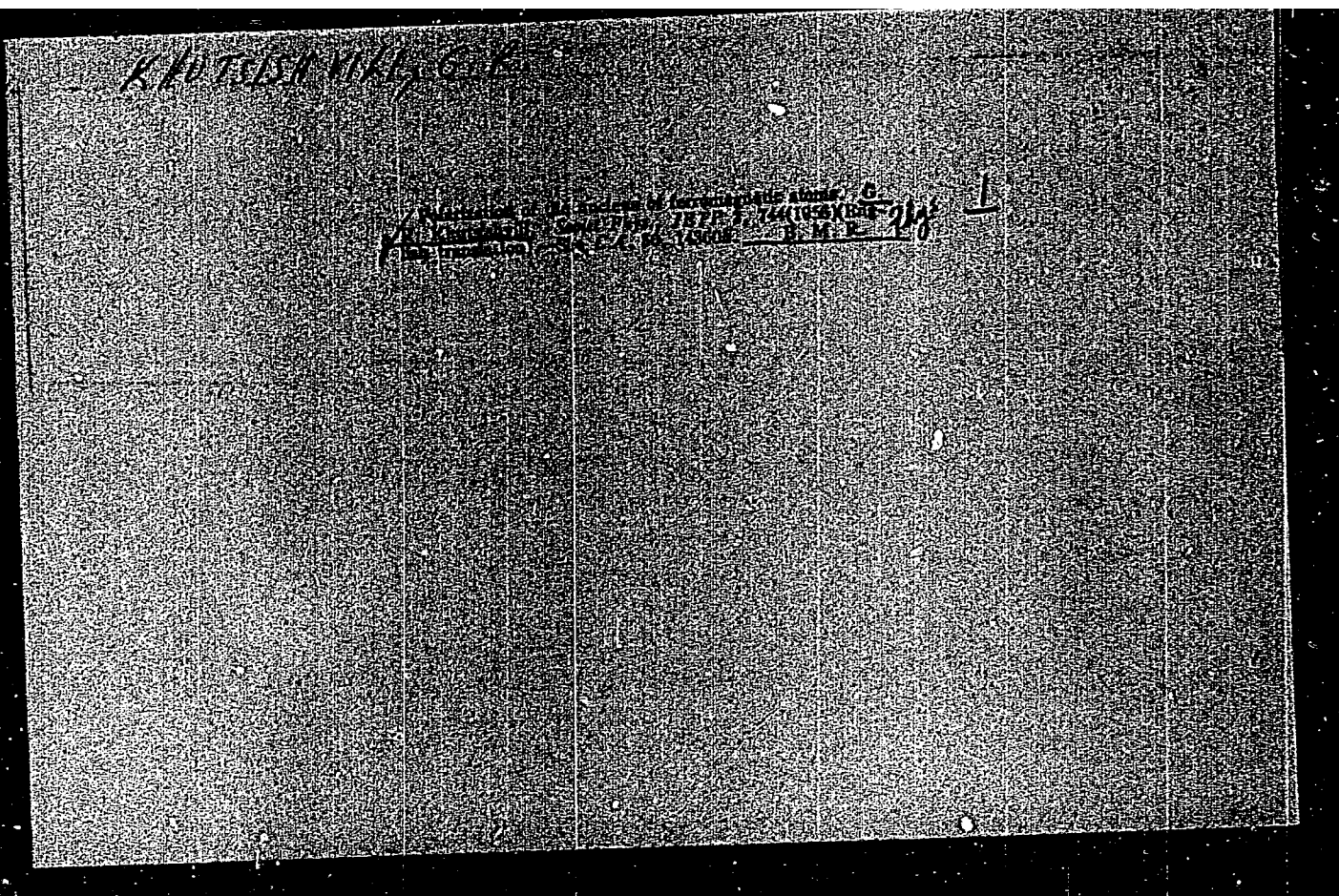
Title : Thermodynamic theory of magnetic relaxation

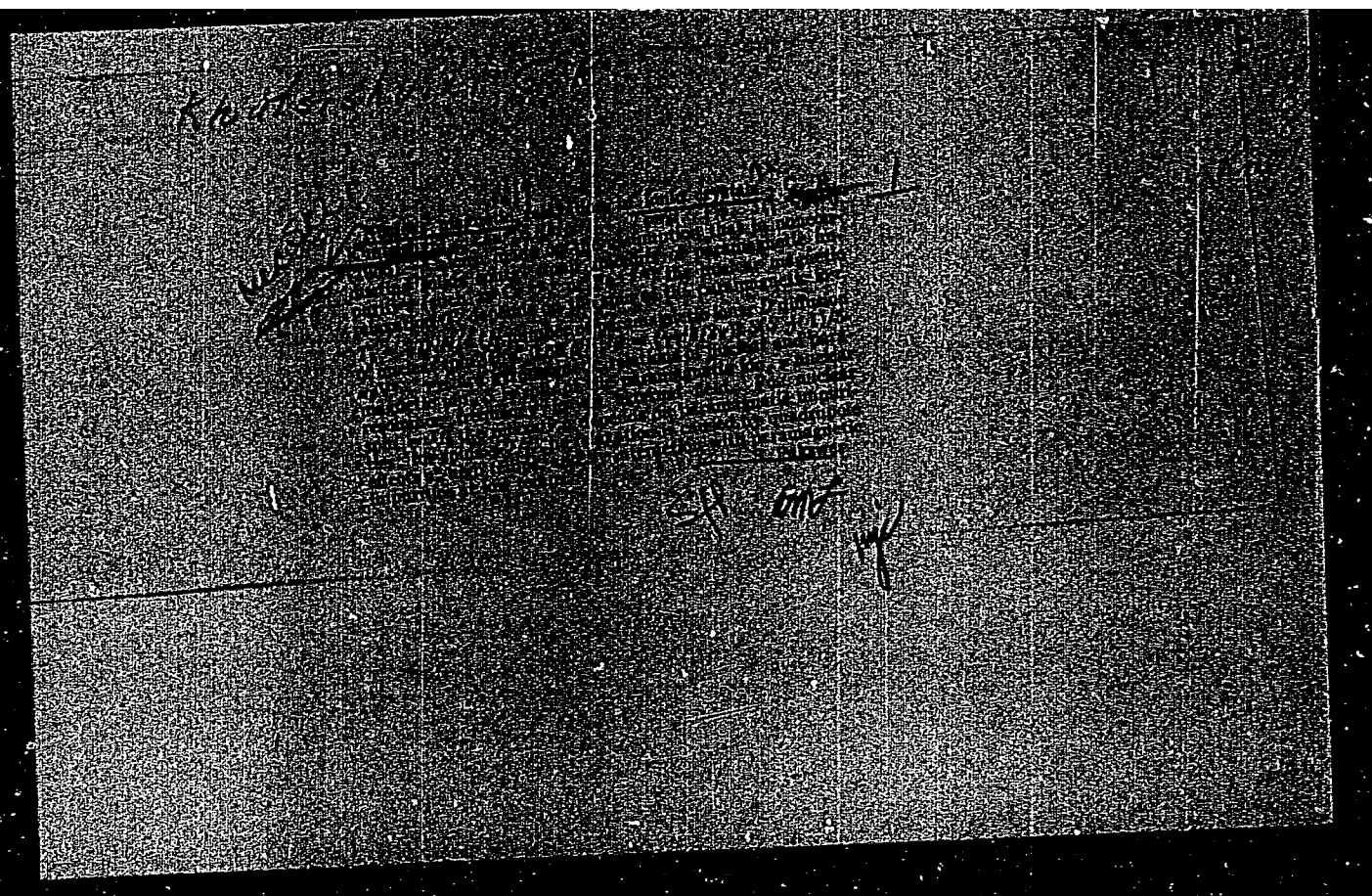
Periodical : Zhur. eksp. i teor. fiz., 29, September 1955, 329-333

Abstract : The author presents thermodynamic considerations of magnetic relaxation. By means of the application of the principle of symmetry of the kinetic coefficients he finds the dependence of magnetization and internal temperature of the spin system upon the time. He discusses the conditions for the fulfillment of which the internal spin equilibrium is attained extremely more rapidly than the equilibrium of the spin system with lattice. The author thanks Academician L. D. Landau for his interest. Five references: e.g. I. G. Shaposhnikov, *ibid.*, 19, 225, 1949.

Institution : Institute of Physics, Academy of Sciences of the Georgian SSR

Submitted : May 22, 1954





KHUTSISHVILI, G.R.

Conference on theoretical physics in Tiflis. Usp.fiz.nauk 58  
no.3:565-568 Mr '56. (MIRA 9:7)  
(Tiflis--Physics--Congresses)

AUTHOR  
TITLE

PERIODICAL

ABSTRACT

KHUTSISHVILI, G.R.

The  $\beta$ -Radiation of Polarized Nuclei. 56-6-45/56  
( $\beta$ -izlucheniye polyarizovannykh yader.- Russian)  
Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 6,  
pp 1578-1580 (USSR)

At first a general expression for the distribution of the  $\beta$ -particles over energies and angles is given. As is known, the  $\beta$ -interaction represents a mixture of a scalar and a tensorial component. T.D. LEE and C.N. YANG, Phys. Rev., Vol 104, p 254 (1956) computed the angular distribution of the  $\beta$ -radiation of polarized nuclei for the permitted  $\beta$ -transitions  $\Delta I = \pm 1$  (no). Such transitions are caused solely by tensorial interaction. The investigation of the permitted  $\beta$ -transitions  $\Delta I = 0$  (no) is also of interest. By comparing the theoretical results with experimental data for such transitions, some conclusions may be drawn as to the ratio of the constants of  $\beta$ -interaction. The author carried out all computations by means of BORN'S approximation.

First, a formula for the density of the matrix element of the  $\beta$ -transition is given. The relativistic term of the tensorial interaction is not written down here because it is of no importance for the transitions investigated

CARD 1/2

KHUTSISHVILI, G.R.

AUTHOR: Khutsishvili, G.R., Matinyan, S.G.

56-5-12/46

TITLE: On the Form of  $\beta$ -Interaction (K voprosu o forme  $\beta$ -vzaimodeystviya)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 5, pp. 1150-1153 (USSR)

ABSTRACT: Until recently it was assumed that  $\beta$ -interaction can be represented by a connection of scalar- and tensor variants. This state of affairs was changed when the non-conservation of parity in  $\beta$ -decay became known. Polarization phenomena in permitted  $\beta$ -transitions [ $\Delta I = 0, \pm 1, (\text{none})$ ] are computed theoretically. Computations were carried out in Born's approximation. The following expressions are computed and derived:

$$\begin{aligned} W(p, q, \eta, \xi) \\ W(p, \eta, \xi) \\ W(p, q, \eta) \end{aligned}$$

There are 7 non-Slavic references.

ASSOCIATION: Physics Institute of the AN of the Georgian SSR (Institut Fiziki AN Gruzinskoy SSR)

SUBMITTED: April 10, 1957

AVAILABLE: Library of Congress

Card 1/1

CHEISHVILI, O.D.; KHUTSISHVILI, G.R.

Behavior of a polarized deuteron beam in a magnetic field. Trudy  
Inst.fiz.AN Gruz.SSR 6:53-60 '58. (MIRA 15:4)  
(Deuterons—Scattering) (Magnetic fields)

AUTHOR: Khutsishvili, G. R. SOV/56-34-6-46/51

TITLE: On the Overhauser Effect in Non-Metals (Ob effekte Cverkhauzera v nemetallakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 6, pp. 1653-1654 (USSR)

ABSTRACT: First the author mentions some previous papers on this effect. This paper deals with the calculation of the stationary nuclear polarization. The author investigates a system which consists of a nucleus with the spin  $I$  and of an electron; both of them are placed in a magnetic field with the field strength  $H$ . This system will have  $2(2I + 1)$  levels. This corresponds to the two possible values of the projections of the electron spin and to the  $2I + 1$  values of the projections of the nuclear spin. This paper deals with the most important case that for the nuclear spin all interactions (with exception of the contact interaction) can be neglected. In this case, the relaxation transitions with participation of the nuclear spin satisfy the selection rule  $\Delta(M + m) = 0$ . The total saturation of all  $2I + 1$  lines of the paramagnetic resonance is assumed to be **realizable**. In this case the well-

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On the Overhauser Effect in Non-Metals

SOV/56-34-6-46/51

known result of Overhauser (Overkhauzer) is obtained; the degree of the nuclear polarization is equal to  $f = B_I(2 I \delta)$ ,  $\delta = \beta H/kT$ , where  $B_I$  denotes the Brillouin (Brillyuen) function. In other words, the effective gyromagnetic relation of the nucleus is equal to the gyromagnetic relation of the electron. But non-metals have a well-observable fine structure of the paramagnetic resonance and it is difficult to saturate all its components. An expression is given for the nuclear polarization which corresponds to the total saturation of the components of the hyperfine structure. This formula is also specialized for  $\delta \ll 1$ . and  $\delta \gg 1$ . and then it is discussed in a few words. There are 1 figure and 4 references, 0 of which is Soviet.

ASSOCIATION: Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)  
SUBMITTED: March 26, 1958

Card 2/2

C. R. KHOTsishvili

21(6)  
AUTHOR: Chantov, R.  
TITLE: The Fifth All-Union Conference on the Physics of Low Temperatures (5-ye Vsesoyuznoye soveshchaniye po fizike nizkikh temperatur)  
PERIODICAL: Uspehi fizicheskikh nauk, 1959, Vol 67, Nr 4, pp 743-750 (USSR)

ABSTRACT: This Conference took place from October 27 to November 1 at Tbilisi; it was organized by the Otdeleniye fiziko-matematicheskikh nauk Akademii nauk SSSR (Department of Physico-mathematical Sciences of the Academy of Sciences, USSR). The Academician and Corresponding Member of the Academy of Sciences, Academician P. L. Kapitza, was the main speaker. The conference was attended by about 100 specialists from Tbilisi, Moscow, Khar'kov, Kiev, Leningrad, Sverdlovsk, and other cities as well as by a number of young Chinese scientists at present working in the USSR. About 50 lectures were delivered which were divided according to research fields.

One of the most interesting lectures delivered at this Conference was that by P. L. Kapitza, B. G. Lazarev, Ya. D. Zakharov and V. I. Kozlovich (LPI) on the polymorphism of metals at low temperatures. P. L. Kapitza commented on this topic during the discussion. B. G. Lazarev, V. I. Kozlovich and P. L. Kapitza (LPI) investigated the crystal structure of metals by the methods of low-temperature x-ray diffraction, thermomagnetic and the visual observation of metal surfaces. B. G. Lazarev, V. I. Kozlovich and P. L. Kapitza (LPI) investigated the thermomagnetic properties of compounds of the type  $\text{Al}_2\text{V}$  and  $\text{Al}_2\text{Ti}$ , and dealt with the phenomenon of the "proton wind" predicted by Gurevich. The investigation was carried out at the Departmentally affiliated AS SSSR (Bogdanov Branch, AS USSR). B. G. Lazarev and A. P. Shilov (LPI - Leningrad Physico-technical Institute) gave a report on the measurement of the electrical resistivity of tin and indium polycrystals at very low temperatures ( $^{\circ}\text{K}$ ), and B. G. Lazarev and A. P. Shilov (LPI) spoke about attempts to find the critical temperature of a superconductor in a cuprous oxide. G. V. Kuznetsov (LPI) reported on the investigation of the Overhauser effect in non metals. Lomskaya investigated the electron- and nuclear (proton) resonance in diphenylpicryl hydrazyl at helium temperature. B. G. Lazarev spoke about experiments carried out concerning the orientation of  $^{50}\text{Co}$  and  $^{59}\text{Fe}$  nuclei (in iron) at extremely low temperatures. B. P. Zakhar'chenko and V. P. Geras (LPI) investigated the absorption spectrum of a cuprous oxide crystal in the magnetic field of a helium temperature and observed the effect of the magnetic field on the optical properties of the crystal. V. P. Geras (LPI) gave information on the scientific work of Soviet scientists in foreign countries (Academy of Sciences of the USSR). B. G. Lazarev (LPI) spoke about the abstracting journal "Fizika". The head of the department for problems of the physics of low temperatures, Academician P. L. Kapitza and the President of the Academy of Sciences, Academician S. S. Akhmediev, N. I. Mehlishevskiy closed the Conference. The 6. All-Union Conference on the Physics of Low Temperatures will be held in June and July 1959 in the city of Sverdlovsk.

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Card 10/11

21(7)

307/56-35-2-52/60

AUTHORS: Matinyan, S. G., Khutsishvili, G. R.

TITLE: Isotopic Invariance in Processes With Participation of Anti-hyperons (Izotopicheskaya invariantnost' v protsessakh s uchastiyem antigiperonov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 1(7), pp 546-547 (USSR)

ABSTRACT: This paper investigates the production of antihyperons and their interaction with nucleons and light nuclei on the basis of isotopic invariance. The reaction  $K + N \rightarrow \bar{Y} + N + N$  is very useful for the identification and investigation of the antihyperons. The above-mentioned reaction, applied to protons, gives 2 channels with respect to the charge states (with production of  $\bar{\Sigma}$ -antihyperons):  $K^+ + p \rightarrow \bar{\Sigma}^0 + p + p$  (a) and  $K^+ + p \rightarrow \bar{\Sigma}^- + p + n$  (b). According to the hypothesis of isotopic invariance, the following cross sections are obtained for these reactions:  $\sigma_a = |A_1^1|^2 \cdot 1/2$ ,  $\sigma_b = |A_0^1|^2 + |A_1^1|^2$ .

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$A_t^T$  denotes the amplitude of the transition into the final

SOV/56-35-2-52/60

Isotopic Invariance in Processes With Participation of Antihyperons

state with the total isotopic spin  $T$  when the total isotopic spin of the system (which consists of 2 nucleons) is equal to  $t(=0,1)$ . This implies  $\sigma_b \gg \sigma_a$ . The authors then investigate the reactions  $\tilde{\Sigma}^+ + d \rightarrow n + \pi^- + K^+$  (a),  $\tilde{\Sigma}^+ + d \rightarrow n + \pi^0 + K^0$  (b),  $\tilde{\Sigma}^+ + d \rightarrow p + \pi^- + K^0$  (c). The amplitudes of these processes are calculated on the basis of isotopic invariance. For the cross sections the relations  $\sigma_a + \sigma_c \gg \sigma_b$ ,  $\sigma_b + \sigma_c \gg \sigma_a/3$  and one more group of inequalities are obtained. The verification of these inequalities is of interest from the point of view of the applicability of the hypothesis of isotopic invariance to interactions which include strange particles and, especially, antihyperons. Such investigations can be generalized immediately for light nuclei with zero isotopic spin ( $\text{He}^4$ ,  $\text{C}^{12}$ , etc.). There are 2 references, 2 of which are Soviet.

ASSOCIATION: Institut fiziki Akademii nauk Gruzinskoy SSR (Institute of Physics, AS Gruzinskaya SSR)

Card 2/3 2

24(3)

SOV/86-35-4-00/11

AUTHOR:

Khutsishvili, G. R.

TITLE:

On the Overhauser Effect in Nonmetals. II (Ob effekto Overkhausera v nemetallakh. II)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 4, pp 1531 - 1538 (USSR)

ABSTRACT:

In the course of recent years several authors investigated the variations of the Overhauser-method of investigating nuclear polarization in paramagnetic salts and semiconductors (Refs 1-5). Already in an earlier paper (Ref 7) the author himself calculated the degree of steady nuclear polarization which occurs in the case of a total saturation of one of the components of hyperfine structure in paramagnetic resonance. The case was investigated in which the relaxation of nuclear spin occurs only as a result of hyperfine (contact)-interaction with the spin of the electron shell. The present paper is based upon the results obtained

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On the Overhauser Effect in Nonmetals. II

SOV/56-55-4-35/52

by the afore-mentioned earlier paper. The case of a partial saturation of one or more components of the hyperfine structure of paramagnetic resonance and the part played by other correlation mechanisms was investigated. A system is investigated, which consists of an electron shell (effective spin  $S=1/2$ ) and a nucleus (spin  $I$ ), which is located in an external field  $H$ . Proceeding from the hamiltonian, the 4 types of relaxation transition are investigated: 1)  $\Delta M = \pm 1, \Delta m = 0$  (electron spin relaxation); 2)  $\Delta M = -\Delta m = \pm 1$  (relaxation due to hyperfine (contact) interaction); 3)  $\Delta M = \Delta m = \pm 1$  and 4)  $M=0, \Delta m = \pm 1$  (the possible quadrupole relaxation  $\Delta M=0, \Delta m = \pm 2$  is neglected).  $M$  and  $m$  denote the projection of electron- and nuclear spin on the  $H$ -direction). These 4 cases are dealt with in detail for various  $I$ -values. A formula is derived for the degree of steady polarization of nuclei in the case of a partial saturation of one of the components of paramagnetic resonance hyperfine structure (paramagnetic salt

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On the Overhauser Effect in Nonmetals. II

307/56-55-4-31/58

or semiconductor with donor or acceptor impurity).  
An expression was obtained also for the case in  
which all components have the same partial saturation.  
For the case  $I = 1/2$  also the part played by the non-  
contact terms in nuclear relaxation is taken into  
account. There are 2 figures and 12 references, 2 of  
which are Soviet.

ASSOCIATION: Tbilisskiy gosudarstvennyy universitet (Tbilisi State  
University)

SUBMITTED: May 31, 1958

Card 3/3

24(5), 24(3)

SOV/56-35-5-24/56

AUTHORS: Khutsishvili, G. R., Cheyshvili, O. D.

TITLE: Double Elastic Scattering of Deuterons in a Magnetic Field  
(Dvoynoye uprugoye rasseyaniye deytronov v magnitnom pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,  
Vol 35, Nr 5, pp 1226-1231 (USSR)

ABSTRACT: Mendlowitz and Case (Mendlovits, Keyz) (Ref 1) carried out a theoretical investigation of the double elastic scattering of an electron beam for the case in which a magnetic field that is constant and homogeneous with respect to time acts upon it between the scatterers. Further, the authors of this paper theoretically investigated the double elastic scattering of a beam of particles with integral spin in the magnetic field. It is shown that in this case (contrary to what is the case with particles with half-integral spin) measurement of double elastic scattering in the magnetic field furnishes additional data concerning the scattering amplitudes. According to Cheyshvili (Ref 2) the following ansatz is used for the scattering amplitude (deuteron on nucleus with spin 0):

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SGV/56-35-5-24/56

Double Elastic Scattering of Deuterons in a Magnetic Field

$$F(\vartheta, \varphi) = A(\vartheta) + B(\vartheta)(\vec{S}\vec{n}) + C(\vartheta)(\vec{S}\vec{n})^2 + \frac{1}{2}D(\vartheta)\{(\vec{S}\vec{k}_0)(\vec{S}\vec{k}) + (\vec{S}\vec{k})(\vec{S}\vec{k}_0)\},$$

where  $\vec{k}_0$  and  $\vec{k}$  denote the unit vectors in the direction of the deuteron momentum before and after scattering respectively,  $n = [\vec{k}_0 \vec{k}] / \sin \vartheta$ , the unit vector vertical to the scattering plane,  $S$  is the spin operator of the deuteron, and  $A, B, C, D$  are functions of the scattering angle and of deuteron energy. An expression is derived for the angular distribution of double elastic scattering, and the special cases for longitudinal and transversal fields are investigated. Formulae are also given for the differential cross section. There are 5 references, 2 of which are Soviet.

ASSOCIATION: Institut fiziki Akademii nauk Gruzinskoy SSR (Physics Institute of the Academy of Sciences of the Gruzinskaya SSR)

SUBMITTED: May 27, 1958

Card 2/2

S/058/62/000/004/046/160  
A058/A101

AUTHOR: Khutsishvili, G. R.

TITLE: Resonance saturation, the Overkhauser effect and least entropy increase

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 36-37, abstract 4V270  
("Pizikis institutis shromebi. Sakartvelos SSR Metsnierebata Akademia, Tr. In-ta fiz. AN GruzSSR", 1960, v. 7, 81-87, English summary)

TEXT: Population values of spin energy levels under conditions of stationary saturation, obtained from conditions of detailed balance, were compared with the values obtained from conditions of least entropy increase (RZhFiz, 1956, no. 5, 13700). Cases of single-line saturation and the Overkhauser effect were examined for  $S = I = 1/2$  for different saturation of the hyperfine structure lines. Calculations were carried out for an arbitrary value of the Boltzmann  $\delta$  factor. It is shown that the principle of least entropy increase is applicable to magnetic resonance only for  $\delta \ll 1$ .

A. Kessenikh

[Abstracter's note: Complete translation]

Card 1/1

82983

S/181/60/002/008/002/045  
B006/B070

24.7900

AUTHORS: Buishvili, L. L., Khutsishvili, G. R.

TITLE: Forbidden Paramagnetic Resonance

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 8, pp. 1685-1688

TEXT: The purpose of the present work is to calculate the energy and the probability of forbidden paramagnetic resonance transitions in paramagnetic salts and semiconductors with donor or acceptor impurities. A study of paramagnetic resonance leads to data on the state of magnetic particles and their environment. Besides the usual allowed paramagnetic resonance, forbidden paramagnetic resonance is also possible, and its spectrum is investigated in the present work. In Ref. 3, similar problems were investigated, but only for weak fields and without obtaining the expressions for the transition probability. Here the authors consider a system consisting of a paramagnetic ion with effective shell spin  $S = 1/2$  which has a nucleus of spin  $I$ . (For example, a system consisting of the nucleus of a pentavalent donor atom with an electron in its neighborhood,

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82983

Forbidden Paramagnetic Resonance

S/181/60/002/008/002/045  
B006/B070

or a trivalent nucleus of an acceptor atom with a hole in its neighborhood). The inner crystalline field is assumed to be axially symmetric, and the external field to be oriented parallel to this. Starting from the spin Hamiltonian obtained in Ref. 4, an expression for the energy levels is obtained in the second approximation for  $|B| \ll g_{\parallel} \beta H$ . For  $I = 3/2$  the eigenfunctions of 8 stationary states are given, and the corresponding 8 levels sketched for  $A > 0$ . Then an expression for the transition probability as function of  $|L_{ki}|^2$  is obtained, and the  $L_{ki}$  (the matrix elements of the operator  $L$  defined by (5)) are investigated. The sets of equations (8) and (9) are obtained for the matrix elements for the different possible transitions in the system considered. These equations give again the  $L_{ki}$  as explicit functions of  $A$ ,  $B$ ,  $H$ ,  $g_{\parallel}$ ,  $g_{\perp}$ , and  $\beta$ . There are 1 figure and 5 references: 1 Soviet, 2 British, and 2 US.

ASSOCIATION: Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: May 18, 1959

Card 2/2

KHUTSISHVILI, G.R.

Orientation of nuclei in the case of saturation of forbidden  
resonance and double resonance. Zhur.eksp.i teor.fiz. 38  
no.3:942-947 Mr '60. (MIRA 13:7)

1. Institut fiziki Akademii nauk Gruzinskoy SSR.  
(Nuclei, Atomic)

83614

S/056/60/038/005/047/050  
B006/B063

9.257/  
24.7900

AUTHOR: Khutsishvili, G. R.

TITLE: Nuclear Polarization in Non-metallic Ferromagnetics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 38, No. 5, pp. 1647 - 1649

TEXT: In 1955, the author of the present paper and Kurti suggested a method of polarizing nuclei of ferromagnetic atoms at the same time. Experiments on ferromagnetic metals have been performed repeatedly. The writer of the present "Letter to the Editor" suggests to carry out such experiments on non-metallic ferromagnetics. The first example he considers is a ferrite, that is to say, a compound of the type  $XO \cdot Fe_2O_3$ .

where X is a bivalent metal ion. Such a ferrite is ferromagnetic if X is a bivalent ion of a metal of the transition group Fe, Co, Ni, Mn, Ti, Cu. These ferrites have the structure of invert spinel. The external magnetic field is assumed to be larger than the saturation field, so that the sample may be regarded as a single domain. At a sufficiently low

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83614

Nuclear Polarization in Non-metallic Ferro-  
magnetics

S/056/60/038/005/047/050  
B006/B063

temperature it is possible to consider the state to approach absolute saturation. Considerations according to the Neel model show that iron nuclei in ferrites of Co, Ni, Mn, Ti, and Cu are not polarized, and that the maximum polarization of iron nuclei in iron ferrite (magnetite) is  $1/3$ . The second example considered in this paper is ferromagnetic garnet, that is to say, compounds of the type  $3X_2O_3 \cdot 5Fe_2O_3$ , where X is a tri-valent rare-earth ion. Considerations made according to a model analogous to the Neel model show that, by applying a magnetic field to a ferrite or garnet cooled to ultra-low temperatures, it is possible to polarize not only the nuclei of ferromagnetic atoms but also those of some paramagnetic atoms. There are 9 references: 3 Soviet, 1 US, and 5 French.

ASSOCIATION: Institut fiziki Akademii nauk Gruzinskoy SSR (Institute of  
Physics of the Academy of Sciences Gruzinskaya SSR)

SUBMITTED: March 13, 1960

Card 2/2

BUISHVILI, L.L.; KHUTSISHVILI, O.R.; CHEYSHVILI, O.D.

Magnetic relaxation in ferromagnetic metals. Zhur. eksp. i teor.  
fiz. 39 no.3:726-736 S '60. (MIRA 13:10)

1. Institut fiziki Akademii nauk Gruzinskoy SSR.  
(Ferromagnetism)



S/053/60/071/01/01/011  
B006/B011

AUTHOR: Khutsishvili, G. R.

TITLE: The Overhauser Effect <sup>21</sup> and Related Phenomena

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 71, No. 1, pp. 9-69

TEXT: In the present very detailed article, the author offers a survey of a number of phenomena which are directly or indirectly related to the Overhauser effect and its theory. In Part 1 of the introduction, the author mentions some methods of obtaining oriented nuclei. In 1953, Overhauser suggested a method of obtaining polarized nuclei, wherein helium temperatures are the lowest required. The method that had originally been intended for metals only, later proved to be applicable to a number of nonmetallic nuclei as well. Part 2 deals with the so-called contact interaction of electron- and nuclear spin. The details discussed include the hydrogen atom and alkali metals, the metals of the first group, silicon or germanium with pentavalent donor- or trivalent acceptor impurity, the F-center in alkali halide crystals, the paramagnetic ion with a nucleus having a spin. Part 3 is devoted to the investigation of saturation of

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The Overhauser Effect and Related Phenomena

S/053/60/071/01/01/011  
B006/B011

paramagnetic resonance, and Part 4 discusses the hyperfine structure of paramagnetic resonance (paramagnetic salts, silicon or germanium with pentavalent donor- or trivalent acceptor impurities having a spin in the case of the impurity nucleus. Further, it describes the ordinary (permitted) paramagnetic resonance and the forbidden paramagnetic resonance, the fine structure of the forbidden paramagnetic resonance and the fine structure in the case of resonance on F-centers. This fine structure is not observable in the case of paramagnetic resonance in metals, semiconductors at high temperatures or liquids with paramagnetic ions, if the paramagnetic nucleus has no spin. Part 5 describes the Overhauser effect in the case in which all components are fully saturated. Fundamental formulas are given in this connection. Part 6 describes the Overhauser effect in metals (relaxation of conduction electrons, polarization of nuclei in metals, shift of resonant frequency with saturation, comparison of theoretical with experimental results). Part 7 deals with the Overhauser effect in liquid and solid diamagnetics with paramagnetic impurities (general representation according to Abragam and Bloembergen, hyperfine interaction, diamagnetic liquids with paramagnetic impurities, solid diamagnetics with paramagnetic impurities, generalization of results, comparison with

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The Overhauser Effect and Related Phenomena

S/053/60/071/01/01/011  
B006/B011

experimental results, forced dynamic polarization of nuclei). Part 8 deals with the Overhauser effect in paramagnetic salts and semiconductors (general theory, equal partial saturation of all components, saturation of one of the components of the hyperfine structure, part played by non-contact terms, comparison with experiment, Overhauser effect in weak magnetic field). In Part 9, the Overhauser effect is studied in alkali halide crystals and alkali ammonium solutions, and in Part 10 from the viewpoint of the general principles of statistical physics and thermodynamics. Nonsteady methods are finally dealt with in Part 11 (saturation of forbidden resonance - Jeffries method; method of double resonance (Feher method); experiments by Abragam and Combrisson; magnetic relaxation in silicon with pentavalent impurity). Final considerations are made in Part 12. The mode of representation is for the most part taken from Abragam. N. A. Bekeshko, Ye. O. Kondorskiy, and G. Lomkatsi are mentioned. There are 10 figures, 1 table, and 98 references, 20 of which are Soviet. ✓

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KHUTSISHVILI, G. R.

"The role of the diffusion barrier at spin diffusion"

report to be submitted for the 8th Intl. Conf. on Low Temperature Physics (IUPAP)  
London, England, 16-22 Sep 62.

ACCESSION NR: AT3012966

S/2749/62/008/000/0203/0207

AUTHOR: Buishvili, L. I.; Khutsishvili, G. R.

TITLE: Overhauser effect in a weak magnetic field

SOURCE: AN GruzSSR. Institut fiziki. Trudy\*, v. 8, 1962, 203-207

TOPIC TAGS: Overhauser effect, fine structure, hyperfine structure, aligned nuclei, paramagnetic salt, paramagnetic atoms with spin, oriented nuclei, orientation parameters

ABSTRACT: The case of a paramagnetic salt is considered whose paramagnetic atoms have spins. In this case the Overhauser effect can apply to the fine structure splitting or to the splitting due to the anisotropic hyperfine splitting. Expressions are derived for the nuclear orientation parameters  $f_1$  and  $f_2$  when one of the components of the fine or hyperfine structure is saturated by the weak magnetic field. Orig. art. has: 2 figures and 14 formulas.

ASSOCIATION: Institut fiziki AN GruzSSR (Physics Institute, AN

Cord 1/2

KHUTSISHVILI, G.R.

Spin structure of hole levels in the degenerate band and  
cyclotron resonance saturation. Fiz.tver.tela 4 no.10:2708-  
2713 0 '62. (MIRA 15:12)

1. Institut fiziki AN Gruzinskoy SSR, Tbilisi.  
(Germanium) (Nuclear Spin) (Cyclotron resonance)

HL155

S/181/62/004/010/050/063  
B102/B112244450  
447700  
AUTHORS:Baramidze, G. A., Gurgenshvili, G. Ye., and Khutsishvili,  
G. R.

TITLE:

Quantum theory of cyclotron resonance in a degenerate band

PERIODICAL:

Fizika tverdogo tela, v. 4, no. 10, 1962, 2958-2963

TEXT: According to Luttinger (Phys. Rev. 102, 1030, 1956) the hole levels in the degenerate valence band of germanium can be divided into four groups, two of which ( $a^+$ ,  $b^+$ ) appertain to light and two ( $a^-$ ,  $b^-$ ) to heavy holes. If the initially applied magnetic field is crossed by an alternating electric field then cyclotron resonance absorption takes place and, as shown by Goodman (Phys. Rev. 122, 397, 1961), transitions take place not only between levels of one group but also between  $a^+$  and  $a^-$  or between  $b^+$  and  $b^-$ . If the alternating electric field is applied along the magnetic field then transitions between the level groups  $a$  and  $b$  are excited as is shown in the present paper. The probabilities of the various cyclotron transitions possible are calculated. The interaction between the holes and the alternating field is described by

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Quantum theory of cyclotron ...

S/181/62/004/010/050/063  
B102/B112

$$F = \mathcal{H}(\vec{k} - \frac{e}{c} \vec{A}) - \mathcal{H}(\vec{k}) = \frac{\partial \mathcal{H}(\vec{k})}{\partial \vec{k}} \cdot \frac{e}{c} \vec{A}, \quad (1)$$

where  $\mathcal{H}(\vec{k})$  is the hole Hamiltonian in the constant magnetic field,  $\vec{k}$  the momentum of the holes without alternating field and  $\vec{A}$  the vector potential of the incident wave;  $F = V e^{-i\omega t} + V^+ e^{i\omega t}$ ;  $V = \frac{e}{c} \frac{\partial \mathcal{H}(\vec{k})}{\partial \vec{k}} \cdot \vec{A}_1$ . The transition probability per unit time is given by

$$W(i \rightarrow f, \omega) = \frac{2\pi}{\hbar^2} |(f|V|i)|^2 \varphi(\omega), \quad (6),$$

$\varphi(\omega)$  gives the line shape. It is obvious that in the case of a nondegenerate band with isotropic square dispersion law

( $\mathcal{H}(\vec{k}) = k^2/2m^*$  and  $V = e\vec{k}\vec{A}_1/m^*c$ ) a field  $\vec{E} = 2\vec{E}_1 \cos \omega t$  applied parallel to the magnetic field causes no transition. A vertical field however, does cause such transitions:

$$W(n \leftrightarrow n+1, \omega) = \frac{\pi c e E_1^2}{\hbar H} (n+1) \varphi(\omega). \quad (12);$$

Card 2/5



8/181/62/004/010/050/063  
B102/B112

Quantum theory of cyclotron ...

$\vec{A}_1 = -ic\vec{E}_1/\omega$ . The cyclotron transitions in the degenerate valence band of germanium are studied.  $\gamma_2 = \gamma_3 = \bar{\gamma}$  and  $q = 0$  is assumed for the Luttinger parameter of the hole Hamiltonian (spherical symmetry). Thus

$$\mathcal{H}(\mathbf{k}) = \frac{1}{m} \left\{ \left( \gamma_1 + \frac{5}{2} \bar{\gamma} \right) \frac{k^2}{2} - \bar{\gamma} (\mathbf{k} \mathbf{J})^2 + \left( \gamma_1 - \frac{1}{2} \right) \frac{e}{c} \mathbf{J} \mathbf{H} \right\}. \quad (14) \text{ and}$$

$$V = \frac{e}{mc} \left\{ \left( \gamma_1 + \frac{5}{2} \bar{\gamma} \right) (k_x A_x + k_y A_y) - \bar{\gamma} [(k_x J_x + k_y J_y) (\mathbf{A} \mathbf{J}) + (\mathbf{A} \mathbf{J}) (k_x J_x + k_y J_y)] \right\}. \quad (17)$$

are obtained. If the electric field is perpendicular to the magnetic field then

$$V_x = \frac{eA}{mc} \left\{ \left[ \gamma_1 + \bar{\gamma} \left( \frac{5}{2} - 2J_z^2 \right) \right] k_x - \bar{\gamma} (J_x J_y + J_y J_x) k_y \right\}. \quad (18)$$

and the possible transitions are

$$\begin{aligned} a^\pm(n) &\leftrightarrow a^\pm(n+1), & b^\pm(n) &\leftrightarrow b^\pm(n+1), \\ a^\pm(n) &\leftrightarrow a^\mp(n+1), & b^\pm(n) &\leftrightarrow b^\mp(n+1). \end{aligned}$$

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Quantum theory of cyclotron ...

S/181/62/004/010/050/063  
B102/B112

In the case of parallel fields

$$V_1 = - \frac{eA}{mc} \gamma [(J_x J_z + J_z J_x) k_x + (J_y J_z + J_z J_y) k_y] \quad (19)$$

and the possible transitions are

$$a^{\pm}(n) \longleftrightarrow b^{\pm}(n+1), \quad a^{\pm}(n) \longleftrightarrow b^{\mp}(n+1).$$

At small quantum numbers  $n$  all possible transitions have probabilities amounting to one order of magnitude. For  $n \gg 1$  the transition probabilities for  $a^{\pm}(n) \longleftrightarrow b^{\pm}(n+1)$  tend to zero as  $n$  increases and the frequencies are independent of  $n$ . The transition probabilities of levels of light and heavy holes do not tend to zero as  $n$  increases and the frequencies are dependent on  $n$ . The peaks of the latter disappear against those of the ordinary cyclotron transitions so that if the  $n$  are sufficiently large only two peaks will be obtained that belong to transitions between neighboring levels of one group. There are 2 tables.

Card 4/5

8/181/62/004/010/050/063  
B102/B112

Quantum theory of cyclotron ...

ASSOCIATION: Institut fiziki AN Gruz. SSR, Tbilisi (Institute of Physics  
AS GruzSSR, Tbilisi)

SUBMITTED: June 25, 1962

Card 5/5

24.6300

37861  
S/056/62/042/005/027/050  
B102/B104

AUTHOR: Khutsishvili, G. R.

TITLE: Spin diffusion and magnetic relaxation of nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42,  
no. 5, 1962, 1311-1318

TEXT: Complementing a work by N. Bloembergen (Physica, 15, 386, 1949) a differential equation given there for the z-component of nuclear magnetization is solved analytically for the stationary case, the nuclear spin diffusion in crystals is examined and an expression is derived for the nuclear relaxation time. The existence of a diffusion barrier is taken into account. The concentration N of paramagnetic ions is assumed sufficiently small for them not to influence one another. The system can then be regarded as made up of independent subsystems, each subsystem comprising a paramagnetic ion surrounded by a large number of nuclear spins. The total nuclear momentum of a sphere of radius R corresponds to a standard relaxation time of  $T_1 = 1/4\pi DFN = R^3\beta/3CF$ ;  $D \approx a^2/30T_2$  is the nuclear spin diffusion coefficient,  $T_2$  the transverse time of nuclear

Card 1/3

S/056/62/042/005/027/050  
B102/B104

Spin diffusion and magnetic ...

relaxation,  $a$  the distance between adjacent nuclei,  $\beta = C/D$  (the Bohr magneton) and  $F \ll R$ . The expression obtained for  $T_1$  is discussed in connection with a work by De Gennes (J. Phys. Chem. Sol. 5, 345, 1958) and the approximate determination of  $F$  is also discussed. Let

$b = 0.66\beta^{1/4}$  with the dimension of one length and let  $d$  be the radius of the diffusion barrier. If  $d \ll b$  then  $F = b$ , if  $d \gg b$ , then

$$F = \beta / 3d^3 = 1.6b^4/d^3, \quad (21)$$

$$T_1 = \frac{0.65}{ND\beta} \left(\frac{d}{b}\right)^3 = \frac{(dR)^3}{C} \quad (22).$$

This shows that the existence of a diffusion barrier slows down the reaction. The boundary condition necessary for consideration of the diffusion barrier was taken to be  $dM/dr = 0$  with  $r = d$ . Here  $M$  is the nuclear magnetization,  $r$  the distance of the nuclear spin from the paramagnetic ion. The validity of this condition is briefly examined and it is shown that the result obtained for  $d \gg b$ , namely: (22) agrees with that of Bloembergen et al. (Phys. Rev. 114, 445, 1959) for the non-stationary case. Nuclear spin diffusion occurs when  $r > l$  (where  $l$  represents the larger of the two quantities  $b$  and  $d$ ). The condition necessary for the validity of

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S/056/62/042/005/027/050  
B102/B104

Spin diffusion and magnetic ...

the results obtained here is that  $T_1 = R^3/3DF$  or  $1^6 \ll R^3 b^4/F$  which is fulfilled in any case when  $1 \ll R$ . Finally it is shown, by comparing these theoretical results with experimental results by Leifson and Jeffries (Phys. Rev. 122, 1781, 1961) that the experiment and theory agree better if the diffusion barrier is taken into account.

ASSOCIATION: Institut fiziki Akademii nauk Gruzinskoy SSR (Institute of Physics of the Academy of Sciences, Gruzinskaya SSR)

SUBMITTED: December 13, 1961

Card 3/3

44235

S/056/62/043/006/036/067  
B125/B102

24.6300

B.2500

AUTHOR:

Khutsishvili, G. R.

TITLE:

The spin diffusion, magnetic relaxation and the dynamic polarization of nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 6(12), 1962, 2179 - 2184

TEXT: The role of nuclear spin diffusion in magnetic relaxation and in dynamic polarization of the nuclei in nonconducting crystals containing paramagnetic impurities is investigated. In the stationary case, with no saturating alternating field, the asymptotic solution to the differential equation for the z-component of nuclear magnetization  $M$  is given by  $M(r) = M_0 F/r$ . The z-axis is directed along the external magnetic field and  $M(\infty) = 0$ .  $M(0) = M_0$  is the equilibrium value of  $M$ . The function  $F(b, d)$  (G. R. Khutsishvili, *ZhETF*, 42, 1311, 1962) is described by  $F = b$  for  $d \ll b(4a)$  and by  $F = C/3Dd^3 = 1.6b^4/d^3$  for  $d \gg b(4b)$ .  $F$  is associated with the relaxation time  $T_n$  of the total nuclear magnetic moment of the specimen

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The spin diffusion, magnetic...

S/056/62/043/006/036/067  
B125/B102

by  $T_n = 1/4\pi N D b$ , where  $N$  is the concentration of the paramagnetic centers and  $b$  is the distance from that paramagnetic ion up to which the immediate nuclear spin relaxation is more important than spin diffusion:

$b = 0.68(C/D)^{1/4}$ . The dependence of the diffusion coefficient  $D$  on the distance from the nearest paramagnetic center is approximated by the rectangular well  $D(r) = 0$  for  $r < d$  and  $D(r) = D$  for  $r > d$  (3). With  $\beta$  varying from 0.5 to 0.7, the value obtained from experiments at low temperatures was  $T_n \sim \tau^\beta$ .  $\tau$  is the spin-lattice relaxation time of the paramagnetic ion.

Allowing for the diffusion barrier according to (3) and using  $d = \delta$  (which was assumed in the previous work), the value obtained is, however,  $T \sim \tau$ .

The following holds:  $\delta \sim (\nu_e/\nu_n)^\alpha a$  with  $\tau > T_2$  (8a) and  $\delta \sim (\nu_e \hbar \nu_e H / \nu_n k T)^\alpha a$  with  $\tau < T_2$  (8b), where  $T_2$  is the transverse nuclear relaxation time and  $\nu_e$  and  $\nu_n$  are the absolute values of the gyromagnetic ratios of the paramagnetic ion and of the nucleus. Further  $\alpha = 1/4$  to  $1/3$  holds, where  $\alpha$  is the distance between the nearest nuclear spins. But the model (3) gives (4b) using (2) and  $d = \min[\delta, (b\delta)^{1/2}]$  is consistent with experiments. The

Card 2/4



The spin diffusion, magnetic...

S/056/62/043/006/036/067  
B125/B102

right dependence  $T_n \sim \tau^{5/8}$  and the right order of magnitude of  $T_n$  are obtained at the temperature of liquid hydrogen and of helium. The spin diffusion in the dynamic polarization of the nuclei allowing for the diffusion barrier is investigated for the nuclear spin  $1/2$ . The effective spin of the paramagnetic ion shell also is assumed to be  $1/2$ . The probability for nuclear spin reorientation resulting from the applied alternating field (its frequency is equal to the nuclear Larmor frequency) is given by

$$\frac{T_n}{T_s} = \frac{T_d^{-1} + 4\pi NDF}{T_d^{-1} + 4\pi NDF}, \quad \eta = \eta_m \frac{\Gamma}{C + \Gamma} \frac{4\pi NDF}{T_d^{-1} + 4\pi NDF}, \quad (17)$$

$$\eta_m = \pm \gamma_s / \gamma_n - 1.$$

with  $T_s^{-1} = T_d^{-1} + 4\pi NDF$  and  $\eta = \mathcal{M}_s / \mathcal{M}_0 - 1$ .  $\mathcal{M}_s$  is the stationary value of the magnetic moment,  $\mathcal{M}_0$  is its value for  $r = 0$ .  $T_d$  is the partial relaxation time.  $\eta$  increases with decreasing  $C = 3(\hbar \nu_0)^2 / 10 \tau \hbar^2$  and with increasing  $T_d$ . The diffusion barrier diminishes nuclear polarization and is important

Card 3/4

The spin diffusion, magnetic...

S/056/62/043/006/036/067  
B125/B102

only for microwave fields that are not too powerful.

ASSOCIATION: Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: June 22, 1962

Card 4/4

KHUTSISHVILI, G.R.

Diffusion and relaxation of proton spin in irradiated polyethylenes.  
Fiz. tver tela 5 no.9:2713-2714 S '63. (MIRA 16:10)

1. Institut fiziki AN GruzSSR, Tbilisi.

GURGENISHVILI, G.Ye.; KHUTSISHVILI, G.R.

Quantum oscillations of the relaxation time of nuclei in semimetals.  
Fiz. tver. tela 7 no.5:1335-1341 My '65. (MIRA 18:5)

1. Institut fiziki AN Gruzinskoy SSR, Tbilisi.

L 58531-65 EWT(1)  
ACCESSION NR: AP5012578

UR/0181/65/007/005/1335/1341

AUTHOR: Gurgenshiyili, G. Ye.; Khushishvili, G. R.

TITLE: Quantum oscillations of the relaxation time of nuclei in semimetals

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1335-1341

TOPIC TAGS: semiconductor, quantum oscillation, relaxation time, transition probability, electron gas

ABSTRACT: The purpose of the investigation is to calculate the relaxation time of the nucleus in a semiconductor placed in a magnetic field so strong that the quantization of the spatial motion of the electron (Landau quantization) is of importance, unlike in the case of a metal. The analysis is confined to the case of a strongly degenerate carrier gas. The calculation is carried out for an arbitrary case in which the ratio of the Fermi energy to the  $\hbar\omega_c$  (cyclotron frequency of the conduction electron in an external field) is arbitrary. For simplicity the analysis is limited to the case of a simple nondegenerate energy band with isotropic quadratic dispersion law. It is assumed that the conduction electron gas is in equilibrium. The results show that the relaxation time of the nucleus should oscillate when the ex-

Card 1/2

KHUTSISHVILI, G.R.

Spin diffusion. Usp. fiz. nauk 87 no.2:211-254 0 '65.  
(MIRA 18:11)

L 44264-66 EWT(1)/EEC(k)-2/T/EWP(k) IJP(c) WG/RTW

ACC NR: AP6020221

SOURCE CODE: UR/0056/66/050/006/1641/1648

56  
53  
B

AUTHOR: Khutsishvili, G. R.

ORG: Tbilisi State University (Tbilisskiy gosudarstvennyy universitet)

TITLE: Saturation of an inhomogeneously broadened magnetic resonance line

SOURCE: Zh eksper i teor fiz, v. 50, no. 6, 1966, 1641-1648

TOPIC TAGS: magnetic saturation, EPR spectrum, magnetic susceptibility, magnetic resonance

ABSTRACT: Saturation of an inhomogeneously broadened EPR line has been theoretically studied. The stationary case has been investigated. The imaginary part of the complex magnetic susceptibility has been calculated. The investigation proceeded as follows: first it was based on the theory of homogeneous saturation developed by N. Bloembergen, E. M. Purcell, and R. V. Pound, (Phys. Rev., 73, 679, 1948), and then on the basis of the theory developed by B. N. Provotorov (ZhETF, 41, 1583, 1961 and FTT, 4, 2940, 1962; Phys. Rev., 128, 75, 1962).

Card 1/2

Card 2/2

ACC NR: AR7000861

SOURCE CODE: UR/0058/66/000/009/E028/E028

AUTHOR: Khutsishvili, G. R.

TITLE: Hot spot effect in paramagnetic relaxation

SOURCE: Ref. zh. Fizika, Abs. 9E231

REF SOURCE: Sb. Elektron. i ion. protsessy v tverd. telakh. No. 2, Tbilisi, Metsniyereba, 1965, 63-71

TOPIC TAGS: paramagnetic relaxation, heat capacity, phonon (spin) interaction, crystal lattice

ABSTRACT: At low temperatures, the paramagnetic relaxation caused by spin-phonon interaction is of a single-phonon nature, and in the case of a low heat capacity of the lattice and weak anharmonic interactions in the lattice, relaxation can result in the heating up of the lattice degree of freedom. This "hot spot" effect was experimentally detected by Jeffries and Scott on rare-earth ions and theoretically described. The author develops a general phenomenological theory of the "hot spot" effect for ions with an effective  $1/2$  spin in the absence of hyperfine interactions. The theory contains previously known results for particular cases. U. Kopvillem. [Translation of abstract] [DW]

Card 1/1 SUB CODE:20



ACC NR: AR7000860

SOURCE CODE: UR/0058/66/000/009/E026/E026

AUTHOR: Gurenishvili, G. Ye.; Khutsishvili, G. R.

TITLE: Magnetic relaxation of nuclei in semiconductors and semimetals in a quantizing magnetic field

SOURCE: Ref. zh. Fizika, Abs. 9E205

REF SOURCE: Sb. Elektron. i ion. protsessy v tverd. telakh. No. 2. Tbilisi, Metsniyereba, 1965, 72-81

TOPIC TAGS: magnetic field, quantum electronics, nuclear magnetic relaxation

ABSTRACT: The relaxation time of nuclei in semiconductors or semimetals in a magnetic field of such intensity that the quantization of electron space motion becomes essential, is calculated. Cases of nondegenerate and strongly degenerate carrier gas are studied. Relaxation is presumed to occur at the expense of contact interaction of nuclear spins with conduction electrons. It is supposed that the energy zones possess the isotropic quadratic law of dispersion. The presence of peaks in transition probability is established. These peaks are more strongly

Card 1/2

ACC NR: AR7000860

expressed when a small quantity of Landau subzones is populated. In a number of cases these peaks form two series. E. Nagayev. [Translation of abstract] [DW]

SUB CODE: 20/

Card 2/2

ACC NR: AT7000184

SOURCE CODE: UR/3182/65/002/000/0072/0081

AUTHOR: Gurgenshvili, G. Ye.; Khutsishvili, G. R.

ORG: none

TITLE: Magnetic nuclear relaxation in semiconductors and semimetals in a quantizing magnetic field

SOURCE: AN GruzSSR. Institut fiziki. Elektronnyye i ionnyye protsessy v tverdykh telakh, v. 2, 1965, 72-81

TOPIC TAGS: conduction electron, spin relaxation, nuclear magnetic moment

ABSTRACT: In semiconductors, spin relaxation of nuclei through contact with conduction electrons is important at high temperatures and when impurity concentration is sufficiently high. For a semimetal the contact mechanism is substantial even at low temperatures if the effective mass of the carriers is not too small. The purpose of this paper is to calculate the nuclear relaxation times in a semiconductor and semimetal in a magnetic field of such strength that the spatial motion of the electrons is significantly quantized (Landau quantization). Cases of nondegenerate and strongly degenerate carrier gases are examined. Results are not pertinent for metals because in metals the difference in the energies of neighboring Landau levels are always much less than the Fermi boundary energy. The nuclear relaxation time was calculated for

Card 1/2

ACC NR: AT7000184

the general case. For simplicity, only the case of a simple nondegenerate energy zone with an isotropic quadratic dispersion is considered. Equations are given for the case in which the resonance of the conduction electrons is partially saturated. If the nuclear magnetic moment in a semiconductor is 2 magnetons,  $u^2(0) = 200$ ,  $m/m = 1$ ,  $T = 1^\circ\text{K}$ , the nuclear relaxation time is about 1 hr when  $H = 5 \cdot 10^4$  oersted and about 20 min when  $H = 10^5$  oersted. For semimetals with large atomic numbers,  $u^2(0)$  reaches up to the order of 1000, and the relaxation time is much shorter. Orig. art. has: 50 formulas, 1 figure.

SUB CODE: 20/

SURM DATE: none/

OTH REF: 006

Card 2/2

KHUTSISHVILI, I.

They master aviation skills. Kryl.rod. 6 no.4:10 Ap '55.  
(MIRA 8:9)

1. Predsedatel' komiteta Dobrovol'nogo obshchestva sodeystviya armii, aviatsii i flotu avtoremontnogo zavoda, g. Tbilisi.

(Tiflis--Aeronautics)

KHUTSISHVILI, I. I.

"Protein-Vitamin Paste From Potato Leaves and Investigation of Its Food Effectiveness on Chicks and Young Swine." Cand Agr Sci, Yerevan Zootechnical Veterinary Inst, USSR Higher Education USSR, Tbilisi, 1955. (KL, No 17, Apr 56)

SO: Sum. No. 704, 2 Nov 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (16).

USSR / Farm Animals. General Problems.

Q-1

Abs Jour : Ref Zhur - Biol., No. 14, 1958, No. 64400

Author : Khutsishvili, I.I.  
Inst : Scientific Research Institute of Animal Breeding.  
Title : The Results of Experiments in Feeding the Protein-Vitamin  
Pulp of Potato Leaves to Chickens and Growing Pigs.

Orig Pub : Sb. tr. N.-1. in-t zhivotnovodstva. GruzSSR, 1957, 2,  
205 - 220

Abstract : The potato leaves contain 40-47 mg % of solanine  
per 100 g. dry matter, and in the protein-vitamin pulp  
obtained from the leaves there is 2.5 - 4.5 mg % of it.  
Feeding the pulp to growing pigs in the amounts of 0.0 -  
1 kg and to chicks, 3 - 3.5 g per head, replaced  
vitamin A, and green and silage feeds. The pulp had a  
favorable effect on the growth and development of chicks,

Card 1/2

KHUTSISHTIL, L.A.

3(5,6) PHASE I BOOK EXPLORATION SOV/2899  
Vsesoyuzny nauchno-issledovatel'skiy institut geofizicheskikh metodov razvedki  
Prikladnaya geofizika; sbornik statey, vyp. 23 (Applied Geophysics: Collection of Articles, No. 23) Moscow, Gostoptekhnizdat, 1959.  
282 p. 3,500 copies printed.  
Ed.: M.L. Polshkov; Exec. Ed.: N.M. Kuz'mina; Tech. Ed.: A. S. Polosina.

PURPOSE: This book is intended for scientific, engineering, and technical personnel of industrial geophysical exploration services.  
COVERAGE: This is a collection of 18 articles by various authors on aspects of geophysical exploration. The material treated in the articles is divided into four categories: the physical properties of rocks in specific geological regions, methods and techniques used in industrial geophysical exploration, concepts in the theory of electrical exploration, and the economics involved in geophysical operations. Specifically, the authors discuss the geologic structures of the central parts of the Russian Platform, southern Siberia, the West Siberian Plains, the eastern part of the Siberian Platform, and the Minusinsk basins; electrical frequency sounding, neutron logging, gamma spectrometry techniques, and the standard equipment and installations of the geophysical services of the petroleum industry in the USSR. References accompany each article.

Nikolayevskiy, A.A. Density Characteristics of the Geological Profile of the Eastern Part of the Siberian Platform 112  
Galaktionov, A.B. Density of Sedimentary Beds of Ustyurt 127  
Tarkov, A.P. Nature of the Anomalous Gravitational Field of the Minusinsk Basins 136  
Teskina, A.Ya. Methods of Solving Problems in Neutron Logging 141  
Kantor, G.A. The Effect of the Diameter of a Borehole on Instrument Readings in Neutron-Neutron Logging 174  
Medostup, G.A., P.M. Prokof'yev, A.I. Kholin, and A.P. Zaitovich. Use of Differential Gamma-Spectrometry in Petroleum Geology 193  
Yoshobornik, M.I. The Speed of Electrical Logging in Combined Measurements With an Arbitrary Division of Channels 202  
Polyakov, Ye. A. An Equivalent Electrical Schematic for an Electrode 217  
Abb., E.A., V.M. Zaporozhets, R.I. Plotnikov, and L.A. Khutshvili. Some Problems in the Design of a Borehole Neutron Generator 224  
Kozlov, P.T. Basic Assets of the Geophysical Services in the Petroleum Industry of the USSR 234  
AVAILABLE: Library of Congress

CARD 4/4

SOV/2899  
12-21-59



L 47099-66 EWT(1)/EWT(m) WTV

ACC NR: AR6016491 SOURCE CODE: UR/0272/65/000/012/0108/0108

AUTHOR: Ab, E. A.; Andrianova, G. M.; Plotnikov, R. I.; Khutsishvili, L. A.

TITLE: Special tubes for the portable equipment for x-ray spectral analysis

SOURCE: Ref. zh. Metrologiya i izmeritel'naya tekhnika, <sup>10</sup>Abs. 12.32.930

REF SOURCE: Sb. Geofiz. priborostr. Vyp. 22. L., Nedra, 1965, 81-87

TOPIC TAGS: x ray emission, x ray measurement, x ray spectrum, x ray spectroscopy, spectrum analysis, x ray tube, portable x ray equipment

ABSTRACT: The drawbacks and limitations of x-ray radiometric analysis with the use of type T<sup>170</sup> or BaCl<sup>40</sup>O<sub>3</sub>  $\gamma$ -quantum isotope sources are pointed out, In developing dispersionless field spectrometers, the use of special x-ray tubes makes it possible to increase emission efficiency considerably, to provide for radiation measurement safety while simplifying protection by the absence of the hard-emission component and to alter the spectral composition of the emission either by replacing the plates or by using secondary emitters. Examples of

Card 1/2

UDC: 389:539.184:537.531:621.386.2

L 47099-66

ACC NR: AR6016491

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using tubes with various methods of excitation in assaying rock specimens for zinc and lead are presented. A technical description of BSV-5 and BSV-7 tubes designed for structural analysis is given, and considerations concerning their use in x-ray radiometric analyses are proposed. Basic specifications for special tubes of portable field x-ray radiometric equipment are established, and ways of developing them are outlined. [Translation of abstract] [DW]

SUB CODE: 20, 09, 18/

hs

Card 2/2

AB, E.A.; ANDRIANOVA, G.M.; PLOTNIKOV, R.I.; KHUTSISHVILI, L.A.

Portable X-ray tubes for geophysical apparatus. Vop.rud.gEOFIZ. no.4:  
130-133 '64. (MIRA 18:1)

20702

S/120/61/000/001/040/062  
EO32/E114

21.2100

AUTHORS: Ab, E.A., Andrianova, G.M., Plotnikov, R.I., and  
Khutsishvili, L.A.

TITLE: A Portable Accelerating Tube Incorporating an Ion  
Source for a Neutron Generator

PERIODICAL: Priory i tekhnika eksperimenta, 1961, No.1, pp 129-130

TEXT: The accelerating tube has been developed for a small-size neutron generator which will replace the Po-Be neutron source used in oil and gas well sampling by the Leningradskiy filial, Vsesoyuznyy nauchno-issledovatel'skiy institut geofizicheskikh metodov razvedki (Leningrad Branch, All-Union Scientific Research Institute of Geophysical Exploration Methods). The accelerating tube is illustrated schematically in the figure. The neutrons are produced as a result of the  $D + T$  reaction. accelerated deuteron ions bombard a zirconium-tritium target of a standard type. In order to maintain the pressure in the tube at the required level, a system of getters and pumps is employed. The ion tube is of the arc type and consists of a cylindrical anode and two disc cathodes. The cathode facing the target has  
Card 1/4